W. J. HAGMAN & E. H. WRAY.

SLOTTING MACHINE.

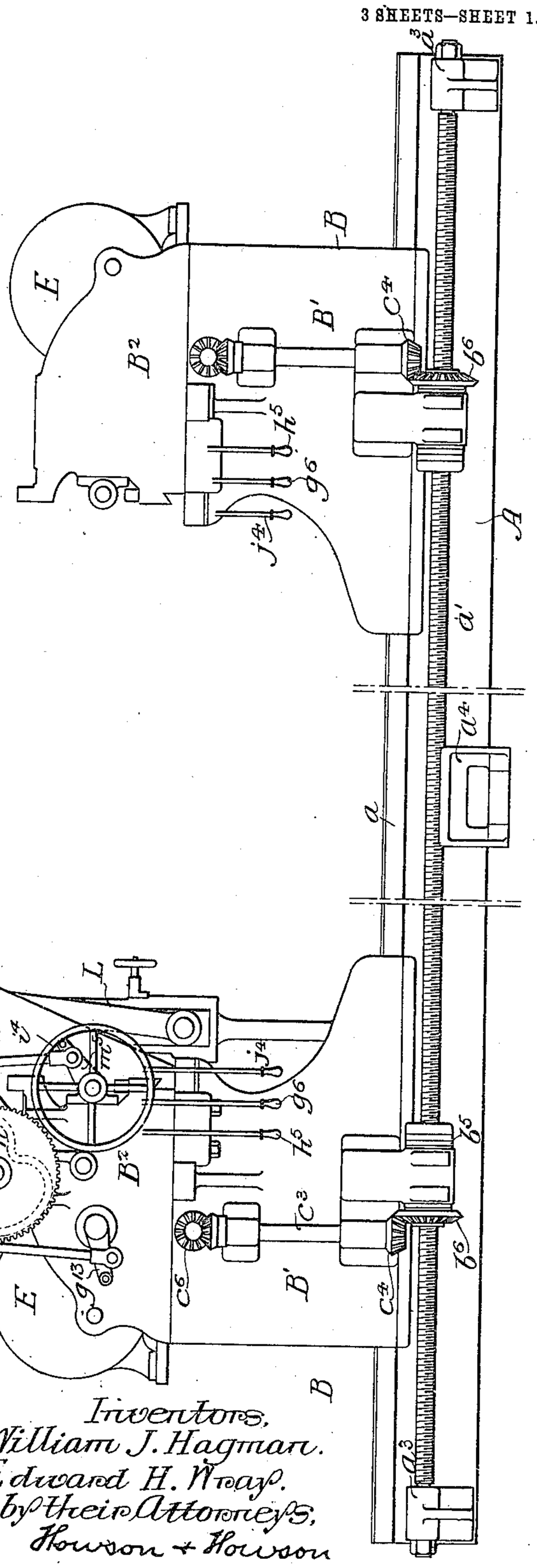
APPLICATION FILED JULY 5, 1906.

964,421.

Patented July 12, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:-
Augustus B. Coppes
Titus H. Sons.

Inventors.
William J. Hagman.
Edward H. Wray.
by their Attorneys,
Howson & Howson

W. J. HAGMAN & E. H. WRAY.

SLOTTING MACHINE.

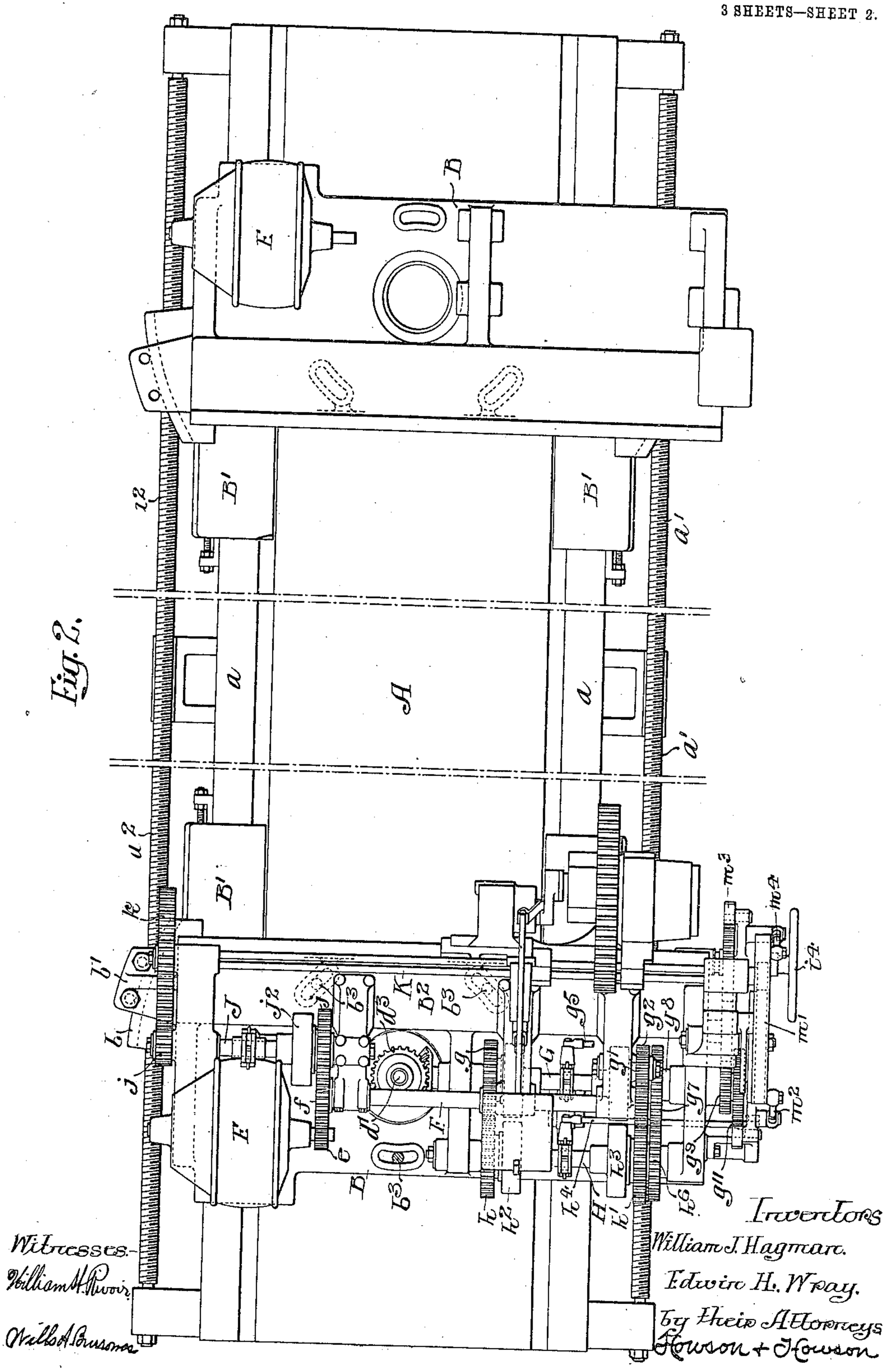
APPLICATION FILED JULY 5, 1906.

964,421.

Patented July 12, 1910.

3 SHEETS—SHEET 2.

Fig. 2.



964,421.

W. J. HAGMAN & E. H. WRAY.

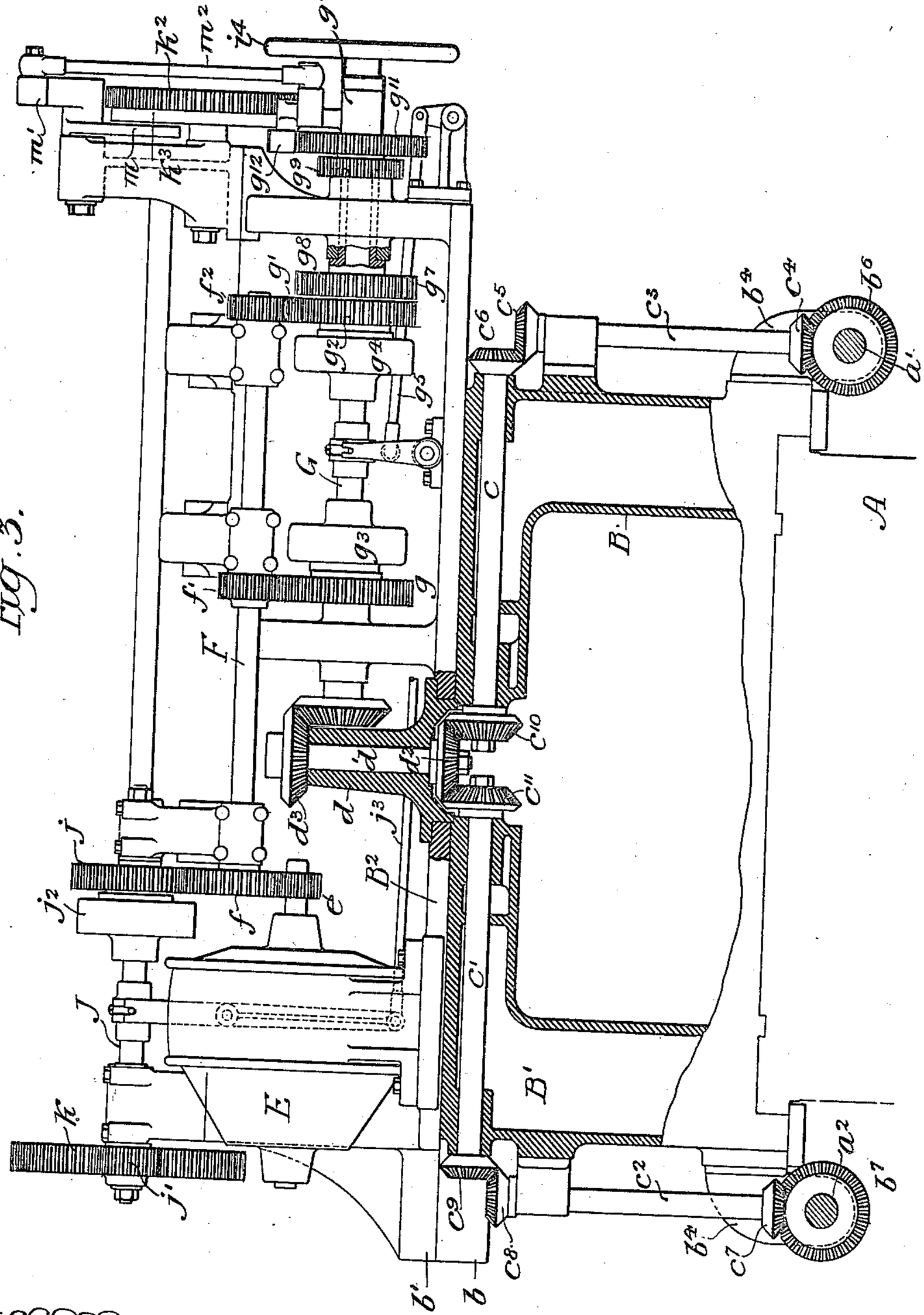
SLOTTING MACHINE.

APPLICATION FILED JULY 5, 1906.

Patented July 12, 1910.

3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:-
Augustus B. Copper.
Titus H. Jones.

Inventors.
William J. Hagman.
Edward H. Wray.
by their Attorneys.
Howson & Howson

UNITED STATES PATENT OFFICE.

WILLIAM J. HAGMAN AND EDWARD H. WRAY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO NILES-BEMENT-POND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SLOTTING-MACHINE.

964,421. Specification of Letters Patent. **Patented July 12, 1910.**

Application filed July 5, 1906. Serial No. 324,837.

To all whom it may concern:

Be it known that we, WILLIAM J. HAGMAN and EDWARD H. WRAY, citizens of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Slotting-Machines, of which the following is a specification.

One object of our invention is to provide a slotting machine, designed to operate on the relatively long frames of locomotives, with mechanism so arranged that the power for longitudinally moving the tool carriage or carriages upon the bed shall be applied equally to the two sides thereof, preferably from a source of power located on said carriage; it being desired to avoid by this means the objectionable strains and many of the other disadvantages at present found in machine tools of the class to which our invention belongs.

We further desire to provide a longitudinally movable carriage with an upper portion arranged to support a transversely movable slotting head and provided with a vertical pivot upon which said portion may be adjusted to permit of said slotting head operating in a plane at any desired angle to the line of the bed.

Another object of the invention is to provide mechanism for conveniently and effectually transmitting power from a suitable motor mounted on the pivoted upper portion of the carriage, to nuts operative on the two feed screws extending along the sides of the bed, and we also wish to provide a machine having the above noted characteristics with a relatively simple and efficient mechanism for transmitting power from a motor situated as described to its various parts which require to be driven.

These objects we attain as hereinafter set forth, reference being had to the accompanying drawings, in which:

Figure 1, is a side elevation illustrating the main portions of a machine constructed according to our invention; the transversely movable tool-carrying head being omitted from one of the carriages; Fig. 2, is a plan of the machine shown in Fig. 1, showing the bed and carriages, with the driving motor for the latter; and Fig. 3, is a transverse vertical section, on a somewhat enlarged scale, of the machine constituting our invention, showing certain of the detail driving mechanism thereof.

In the above drawings, A represents the main frame or bed of the machine, which in the present instance is of relatively great length and provided with longitudinally extending guideways a for the reception of one or more carriages B. Along the sides of this bed are fixed non-rotatable screws a' and a^2 supported in brackets a^3 and provided, if desired, with supports a^4 intermediate of such main supports. Each of the carriages consists of a main portion B′ mounted directly upon the bed, and a portion B^2 mounted on said main portion so as to be adjustable upon a vertical axis; there being, if desired, guides b on said main portion B′ designed to coact with suitably formed circularly curved guideways b' on the pivoted part B^2. Bolts b^3 are provided for retaining the part B^2 in any adjusted position and these fit into slots formed on the arc of a circle, as shown in full and dotted lines in Fig. 1. Projecting from the lower part B′ of the carriage are brackets b^4, within each of which is confined a longitudinally threaded bushing b^5 forming nuts for the reception of the screws a' and a^2 respectively, there being fixed to said bushings beveled gear wheels b^6 and b^7 respectively.

There are in the upper portion of the main part of the carriage a series of bearings in which are supported a pair of horizontally extending shafts c and c', and there are also bearings on each side of the said portion for vertical shafts c^2 and c^3. On the lower end of the last of these shafts is a beveled pinion c^4 meshing with the beveled gear b^6 threaded on the screw a', while on the upper end of said vertical shaft is a second beveled pinion c^5 meshing with a beveled pinion c^6 on the shaft c. Similarly, there are on the second vertical shaft c^2 a pair of beveled pinions c^7 and c^8, respectively meshing with the gear b^7 and with a beveled pinion c^9 on the shaft c'.

On the pivotal part B^2 of the carriage there is provided a vertical bearing d in which is supported a shaft d' extending in the axial line of said part; this shaft having on its lower end a beveled gear d^2 meshing with a pair of gears c^{10} and c^{11} on the two shafts c and c' respectively. Said shaft

also carries on its upper end a beveled gear d^3; these gears being symmetrically placed relatively to the screws a' and a^2 as well as to the shaft d' and others of the parts connecting them with said screws.

On one end of the part B^2 of the carriage is mounted an electric motor E carrying upon its armature shaft a pinion e, and it will be understood that while we preferably use the type of motor shown, it may be replaced by any other suitable source of power. Extending transversely of the carriage and mounted in suitable bearings is a shaft F, having at one end a gear f in mesh with the pinion e of the motor and having at its opposite end and in an intermediate position respectively, two other pinions f' and f^2, of which the first meshes with a gear g loosely mounted on another transverse shaft G and the second meshes with a gear g', which in turn is in engagement with a gear g^2, also loose on the shaft G.

Two clutches g^3 and g^4 are provided whereby either one of the gears g or g^2 may be operatively coupled to said shaft G, there being provided for said clutches suitable actuating mechanism operative through a link g^5 and a lever g^6 connected thereto.

The extreme outer end of the shaft G has fixed to it a toothed or ratchet wheel g^{11} for the reception of a pawl g^{12} carried by an arm g^{13} loosely supported on said shaft. Another shaft J is supported in bearings on the part B^2 of the carriage adjacent to the motor E and carries loose upon it a gear j meshing with the gear f; also having a pinion j' in engagement with a gear k carried on one end of a spline shaft K extending the whole transverse length of the upper part of the carriage. The shaft J has, in addition to the gear wheels, a clutch j^2 whereby the loose gear j may be operatively connected to it, there being a suitable device actuated through a rod j^3 and a lever j^4 whereby said clutch may be thrown into and out of action.

With the above described combination of apparatus all the various operations of the machine are carried out by power received from the motor E carried upon the pivotally mounted part B^2 of the carriage. If it be desired to quickly move said carriage with its parts longitudinally upon the bed A in one direction, the clutch g^3 is operated to couple the gear g to the shaft G, and under these conditions power is transmitted from the motor E through the gears e and f to the shaft F, thence through gears f' and g to the shaft G, from the beveled pinion on this latter shaft to the pinion d^3, shaft d' and to the beveled pinion d^2. This latter pinion drives both of the beveled pinions c^{10} and c^{11}, and power is transmitted from the first of these through the shaft c, beveled pinion c^5, shaft c^3, and beveled pinion c^4 to the beveled pinion b^6 through shaft c', pinions c^9 and c^8, shaft c^2 and pinion d^7 drives the beveled pinion b^7. Said two pinions as shown in the drawings act as nuts and therefore cause the carriage on which they are mounted to move longitudinally of the frame. If, on the other hand, the clutch g^4 be thrown into operation, the direction of revolution of the two pinions b^6 and b^7 is reversed by reason of the fact that power is transmitted through the gears f^2, g' and g^2 in place of the two gears f' and g and the carriage is consequently traversed at a maximum speed and in a reverse direction upon the bed A.

If it be desired to slowly feed the carriage with its tool longitudinally upon the bed, then the clutch j^2 is thrown in, so that the cam k^3 will be driven from the pinion e through gears f and j, shaft J, gears j' and k, shaft K, gear k', and gear k^2. This causes an oscillation of the arm m' upon its supporting spindle or pivot M and consequently an oscillation of the arm g^{13}. The ratchet g^{12} carried by this latter arm then periodically acts upon the gear g^{11} and consequently causes a partial revolution of the shaft G, which movement is transmitted through the axial shaft d' to the two pinions b^6 and b^7 on the screws a' and a^2 so as to feed the carriage as desired.

By loosening the clamping bolts b^3, the part B^2 of the carriage may be turned upon its vertical axis so as to bring the line of motion of its tool slide at any desired angle to the longitudinal line of the machine and that without in any way affecting the operation of the other parts of the device. By providing two feed screws a' and a^2 along two sides of the machine, we are enabled to drive the carriage without causing twisting strains either in it or on the guideways of the bed; it being obvious that the power for moving the carriage is applied in two equal parts, one to each of said feed screws.

We claim;—

1. The combination in a frame slotter of a horizontally elongated bed; a carriage movable thereon; a plurality of nuts on the carriage; a tool on the carriage; means for reciprocating said tool in a vertical line; fixed screws extending along opposite sides of the bed through the nuts on the carriage; driving means for the carriage; and mechanism operatively connecting said driving means to the nuts for turning the same and causing movement of the carriage on the bed.

2. The combination in a frame slotter, of an elongated horizontally extending bed; a plurality of carriages movable thereon; nuts on opposite sides of each carriage; two screws non-revolubly fixed on opposite sides of the bed, and each passing through one of the nuts of each carriage so as to be common to all carriages; and driving means for

the carriages operatively connected with the nuts on each carriage.

3. The combination in a frame slotter, of a horizontally elongated bed; a carriage movable on the bed, and consisting of two upright sections; a centrally placed vertical pivot connecting said sections so as to permit adjustment of the upper section on it as a vertical axis; a tool mounted on the upper section; mechanism for reciprocating said tool; two screws symmetrically disposed relatively to the pivot between the carriage sections and fixedly mounted on opposite sides of the beds; driving means for the carriage; and means having a portion co-axial with the pivot between said sections for operatively connecting the driving means with the screws.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

WILLIAM J. HAGMAN.
EDWARD H. WRAY.

Witnesses:
SAMUEL C. KANE,
DAVID S. WOODS.